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*Annual Radiological Environmental Monitoring
Program Report for the Fort St. Vrain Independent
Spent Fuel Storage Installation*

**Annual Radiological Environmental Monitoring
Program Report for the Fort St. Vrain
Independent Spent Fuel Storage Installation**

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ABSTRACT

This report presents the results of the 2002 Radiological Environmental Monitoring Program conducted in accordance with 10 CFR 72.44 for the Fort St. Vrain Independent Spent Fuel Storage Installation. A description of the facility and the monitoring program is provided. The results of monitoring the predominant radiation exposure pathway, direct and scattered radiation exposure, indicate the facility operation has not contributed to any increase in the estimated maximum potential dose commitment to the general public.

SUMMARY

The purpose of this report is to present the results of the Radiological Environmental Monitoring Program (REMP) conducted during 2002 for the Fort St. Vrain (FSV) Independent Spent Fuel Storage Installation (ISFSI). The results of the thermoluminescent dosimetry network did not indicate an increase in radiation levels above post-loading ambient background attributed to the facility operation. The monitoring program results support the conclusion reached in the Safety Analysis Report that operation of the facility will not result in a significant dose commitment greater than 0.15 mrem/y to the nearest resident.

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INTRODUCTION

The Fort St. Vrain (FSV) Independent Spent Fuel Storage Installation (ISFSI) is a spent fuel dry storage facility located in Platteville, Colorado. The FSV ISFSI is operated by Bechtel BWXT Idaho, LLC for the Department of Energy (DOE). The FSV ISFSI is licensed (SNM-2504) by the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 72 for authorization to store spent nuclear fuel from the Fort St. Vrain Nuclear Station.¹ Spent fuel from the FSV reactor was transferred to the FSV ISFSI between December 26, 1991 and June 10, 1992. The FSV ISFSI license was transferred from the Public Service Company of Colorado (PSCo) to the U.S. Department of Energy, Idaho Operations Office (DOE-ID) on June 4, 1999.

A Radiological Environmental Monitoring Program (REMP) has been implemented for the FSV ISFSI in accordance with 10 CFR 72.44. This report presents the REMP results for 2002.

PROGRAM DESCRIPTION

The REMP is designed to monitor the predominant radiation exposure pathway inherent with the facility design: direct radiation. The direct radiation exposure pathway is monitored using thermoluminescent dosimetry (TLD) located along the 100 meter perimeter fence of the FSV ISFSI. Monitoring locations are identified in Figure 1. A control station is located at the Weld County Sheriff Office in Greeley, Colorado, approximately 17 miles NNE from the FSV ISFSI.

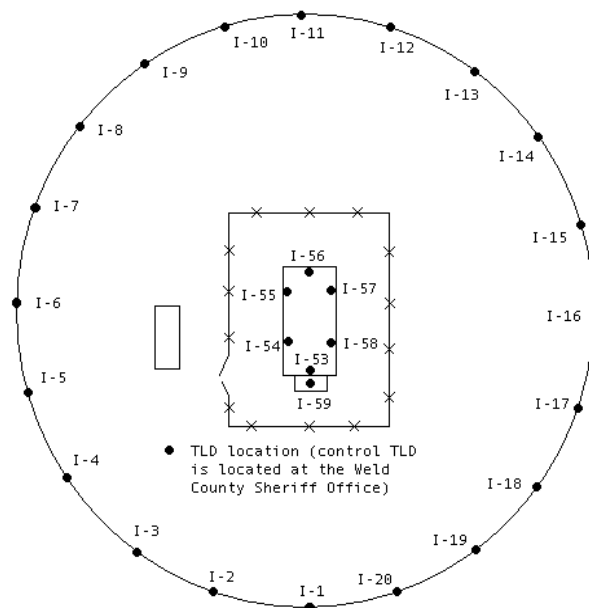


Figure 1. FSV ISFSI Monitoring Locations

Twenty thermoluminescent dosimeters (TLD's) are located around the 100 meter perimeter fence to monitor direct radiation from the FSV ISFSI. One third of the TLD's are changed out and processed each month. An additional seven TLD's are located inside the FSV ISFSI above the charge face and in the alarm station, but are not considered part of the REMP.

Molesieve samples are collected periodically within the ISFSI chimney and charge face and are subsequently analyzed for tritium radioactivity, but this is not considered part of the REMP.

RESULTS

TLD results for the FSV ISFSI are presented in Table 1 in units of mR/d. Dosimetry processing services were provided by the INEEL. The mean daily exposure rate of 0.39 +/- 0.04 mR/d measured at the ISFSI perimeter fence is not significantly different than the five-year historical operation mean of 0.39 +/- 0.05 mR/d last reported by Colorado State University (CSU).² The mean exposure rate of 0.40 +/- 0.05 mR/d measured inside the charge face and alarm station is not significantly different than the four-year historical operation mean of 0.40 +/- 0.06 mR/d for the charge face last reported by CSU.² Previous annual REMP reports (preceding 1999) have indicated that the historical operation mean exposure rates were not significantly above preoperational and background levels for eastern Colorado.

Table 1. FSV ISFSI Exposure Rates (mR/d)

Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Mean
I-1	0.43	-	-	0.39	-	-	0.39	-	-	0.43	-	-	0.41
I-2	-	0.38	-	-	0.37	-	-	0.44	-	-	0.35	-	0.39
I-3	-	-	0.41	-	-	0.41	-	-	0.39	-	-	0.39	0.40
I-4	0.43	-	-	0.40	-	-	0.39	-	-	0.39	-	-	0.40
I-5	-	0.39	-	-	0.38	-	-	0.43	-	-	0.37	-	0.39
I-6	-	-	0.39	-	-	0.37	-	-	0.37	-	-	0.38	0.38
I-7	0.39	-	-	0.38	-	-	0.39	-	-	0.40	-	-	0.39
I-8	-	0.38	-	-	0.38	-	-	0.41	-	-	0.38	-	0.39
I-9	-	-	0.41	-	-	0.39	-	-	0.41	-	-	0.37	0.40
I-10	0.40	-	-	0.38	-	-	0.38	-	-	0.39	-	-	0.39
I-11	-	0.40	-	-	0.38	-	-	0.43	-	-	0.37	-	0.40
I-12	-	-	0.39	-	-	0.37	-	-	0.44	-	-	0.37	0.39
I-13	0.40	-	-	0.38	-	-	0.38	-	-	0.38	-	-	0.39
I-14	-	0.37	-	-	0.38	-	-	0.42	-	-	0.36	-	0.38
I-15	-	-	0.40	-	-	0.38	-	-	0.43	-	-	0.38	0.40
I-16	0.40	-	-	0.38	-	-	0.38	-	-	0.41	-	-	0.39
I-17	-	0.35	-	-	0.37	-	-	0.42	-	-	0.36	-	0.38
I-18	-	-	0.41	-	-	0.37	-	-	0.38	-	-	0.40	0.39
I-19	0.39	-	-	0.39	-	-	0.37	-	-	0.40	-	-	0.39
I-20	-	0.38	-	-	0.38	-	-	0.44	-	-	0.35	-	0.39
Mean	0.41	0.38	0.40	0.39	0.38	0.38	0.38	0.43	0.40	0.40	0.36	0.38	0.39
I-53	-	0.45	-	-	0.43	-	-	0.48	-	-	0.40	-	0.44
I-54	-	-	0.39	-	-	0.35	-	-	0.37	-	-	0.33	0.36
I-55	0.36	-	-	0.37	-	-	0.36	-	-	0.37	-	-	0.37
I-56	-	0.48	-	-	0.44	-	-	0.47	-	-	0.40	-	0.45
I-57	-	-	0.41	-	-	0.37	-	-	0.40	-	-	0.37	0.39
I-58	0.39	-	-	0.38	-	-	0.38	-	-	0.39	-	-	0.39
I-59	0.38	-	-	0.38	-	-	0.39	-	-	0.38	-	-	0.38
Mean	0.38	0.47	0.40	0.38	0.44	0.36	0.38	0.48	0.39	0.38	0.40	0.35	0.40

Although not considered to be a monitoring location, a TLD is located at the control station in Greeley, CO, approximately 17 miles NNE from the FSV ISFSI. The results show the mean exposure rates at the control station to be 0.36 +/- 0.02 mR/d.

Although not part of the REMP, the vault chimneys and charge face are sampled periodically for airborne tritium. The results are presented in Table 2. There was one charge face airborne radioactivity sample indicating 1.2E-12 uCi/cc of tritium in 2002.

Table 2. FSV ISFSI Airborne Tritium Monitoring Results (uCi/cc).

Location	Q1	Q2	Q3	Q4
North Charge Face	<1.05E-12	<8.42E-13	<1.41E-12	<9.18E-13
South Charge Face	<9.66E-13	<9.90E-13	<1.30E-12	<8.63E-13
East Charge Face	<1.17E-12	<9.29E-13	<1.04E-12	<1.19E-12
West Charge Face	<1.50E-12	<1.53E-12	<1.76E-12	1.2E-12
Chimney A	-	<9.17E-13	-	-
Chimney B	-	<1.50E-12	-	-
Chimney C	-	<9.69E-13	-	-
Chimney D	-	<1.61E-12	-	-
Chimney E	-	<9.21E-13	-	-
Chimney F	-	<2.06E-12	-	-

The facility design includes a vault drain system to capture any liquid in the facility. Although not part of the REMP, once per quarter the vault drain is sampled for liquid. No liquid was present in 2002.

DISCUSSION

The FSV ISFSI REMP was successfully implemented during 2002. There was no loss of radiological monitoring data. There were no sampling location changes. There were no deviations from the established sampling schedule.

Since charge face tritium sampling was initiated in 1998, there have been a total of five positive results; one positive result in the South sample, two positive results in the East sample, and two positive results in the West sample. Five out of sixty-four samples, or 8%, have been positive for tritium. Statistically speaking, one would expect about 5% positive results when looking at essentially background concentrations at the 95% confidence level. The most recent sample result (1.2 E-12 uCi/cc) is not the highest of the five positive samples; results have ranged from 6.0E-12 uCi/cc to 2.1E-13 uCi/cc. All five positive results occurred in either the second quarter (2) or fourth quarter (3). This pattern is attributed to the characteristic spring and fall removal of tritium from the atmosphere associated with the relocation of the jet stream and some other weather phenomena.³

The radiation dosimetry results indicate there has been no measurable increase in ambient background radiation levels outside the FSV ISFSI perimeter fence attributed to storage of the FSV fuel. Although tritium was marginally detected in one charge face airborne sample, it can be concluded there were no radionuclides released to the environment in airborne effluents from FSV in 2002. Based on the results of the vault drain samples, it can be concluded there were no radionuclides released to the environment in liquid effluents from FSV in 2002.

It can be concluded from the results of the FSV ISFSI REMP that direct radiation exposure from the facility during 2002 did not contribute to any increase in the maximum potential dose commitment to the nearest resident (0.15 mrem/y) projected in the FSV ISFSI Safety Analysis Report.

REFERENCES

1. 10 CFR 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste", *Code of Federal Regulations*, Office of the Federal Register, August 1988.
2. Fort St. Vrain Independent Spent Fuel Storage Installation (ISFSI) Radiological Environmental Monitoring Program (IREMP), Summary Report for the Period January 1 to December 31, 1997, Department of Radiological Health Sciences, Colorado State University, February 26, 1998.
3. "Tritium in the Atmosphere and Ocean", H. Gote Ostlund, Published in Tritium, Edited by A. Alan Moghissi and Melvin W. Carter, May 1973.